

## Analysis of essential oil in *asternovi-belgii*<sup>1)</sup>

Pan Xuefeng (潘雪峰) Liu Xiaodong (刘晓东) Zhao Xiaohong (赵晓红) Yang Mingfei (杨明非)  
Northeast Forestry University, Harbin 150040, P.R China

**Abstract** The constituents of essential oil of *Asternovi-belgii* were analyzed by GC and GC/MS. 18 peaks were separated by GC and 14 compounds were identified. The identified constituent's accounts for 99.10% of GC peak areas of essential oil. The major chemical constituents of *Asternovi-belgii* are  $\beta$ -Pinene (38.33%),  $\alpha$ -pinene (31.23%), and thujene (16.71%).

**Key words:** *Asternovi-belgii*, Essential oil, GC-MS;

### Introduction

The *asternovi-belgii* has behaved more advantage in cold resistance in planting experiments. But it is tending to be eliminated for late flowering time, simple design and color and smaller flowers. The *Dendranthemax geandiflor* growing in northern has colorful design and fragrant. The colorful designs and fragrant *Dendranthemax grandiflor* growing in northern contains many kinds of medical matters in its essential oil (Yang 1997 and Liu 1996), but it has lower ability of cold resistance than *asternovi-belgii*. In order to breed new varieties and make clear the relation between the two plants mentioned above we have analyzed the essential oil of *asternovi-belgii*. So we can draw up the difference and generality in molecular level. This work is benefit for breeding new variedly researching heredity gent and the developing of flower resources.

### Materials and methods

About 200 g sample of fresh flowers blooming in Harbin were taken and pounded in stone bowl. After washing them into 500 mL distilling flask with 200 mL distilled water, we added 50 mL re-steamed ether for distilling. When ether was distilled and about 100 mL water were distilled, we separated the ether zone. Washing the water zone with a little ether. Combining the ether zone distilling the ether carefully. About 0.5 mL colorless undetermined essential oil sample can be got.

### Analysis

#### Instruments

GC-9A (Japan)

OV-101 quartz capillary column of 25 m $\times$ 0.25 mm

was used. Column perpressure was 750 kPa. Column temperature was 60 $^{\circ}$ C and was raised to 120  $^{\circ}$ C by 10 $^{\circ}$ C/min for keeping 2 min, then was raised to 200  $^{\circ}$ C by 8  $^{\circ}$ C/min for keeping 15 min. The gasification room temperature was 200 $^{\circ}$ C. Detector FID. The carrier gas is N<sub>2</sub>, Split ratio is 20 : 1. and 0.5 $\mu$ L sample injected is suitable.

#### Q-Mass 910(America)

DB-5quartz capillary column of 30 m $\times$ 0.25 mm was used. Column-prepressure was 500 kPa; Column temperature is 60 $^{\circ}$ C and was raised to 200 $^{\circ}$ C by 7 $^{\circ}$ C/min for keeping 15 min. The gasification room temperature was 200 $^{\circ}$ C. The carrier gas is N<sub>2</sub>. Split ratio is 20:1 and 0.1 $\mu$ L sample injected is required.

### Analysis

Choosing the separating conditions by GC-9A (See Fig. 1). Determination in peak area normalization (Yang 1990 and He 1986), By the use of GC-Mass-computer system (NIST Standard Reference Database Series 1a. The NIST/EPA/NIH Mass Spectral Database Version 4.5 February 1994), we have identified the 14 kinds composes of *asternovi-belgii* essential oil compared with the standard reference (Mass Spectrometry Data Center 1983; Heller 1978, 1980)(See Table 1).

### Results and discussion

Out of the 18 composes of *asternove-belgii* essential oil, 14 kinds of composes is identified. They occupied 99.10% of the total area. The main composes are  $\beta$ -pinene (38.33%),  $\alpha$ -pinene (31.23%) and thujene (16.71%). It is different from the *Dendranthemax grandiflor*, in which the main composes are eucalyptol and camphor. This is the reason why the *asternovi-belgii* has no fragrance. The same composes of the two plants are camphene,  $\beta$ -pinene, camphor, borneol and  $\alpha$ -cubebene, in much more different content. The two plants are same family and different genera. And

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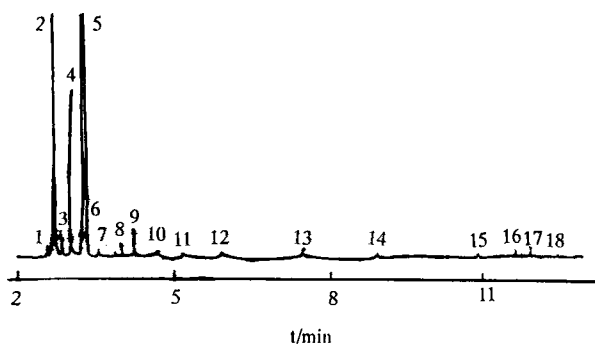
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they also have the same characters and difference. The new plants that we will breed should have the cold-resistance as *asternovi-belgii* and the fragrance

and color as *Dendranthemax grandiflor*. The new plants with the usability of fragrance would be good for northern cold and enjoying.

**Table 1. Constituents of essential oil in *asternovi-belgii***

Peak No.	Name	Time	Molecular formula	(Molecular weight)	Peak area %	Strongest fragment peak
1	3-Hexen-1-ol	2.66	C <sub>6</sub> H <sub>10</sub> O	(100)	0.66	41
2	$\alpha$ -pinene	2.76	C <sub>10</sub> H <sub>16</sub>	(136)	31.23	93
3	camphene	2.82	C <sub>10</sub> H <sub>16</sub>	(136)	3.94	93
4	thujene	2.99	C <sub>10</sub> H <sub>16</sub>	(136)	16.71	93
5	$\beta$ -pinene	3.18	C <sub>10</sub> H <sub>16</sub>	(136)	38.33	93
6	$\alpha$ -phellandrene	3.27	C <sub>10</sub> H <sub>16</sub>	(136)	0.31	93
7	unidentified	3.53			0.46	43
8	limonene	4.05	C <sub>10</sub> H <sub>16</sub>	(136)	1.43	86
9	ocimene(trans)	4.22	C <sub>10</sub> H <sub>16</sub>	(136)	3.79	93
10	2-nonanone	4.84	C <sub>10</sub> H <sub>18</sub> O	(142)	0.22	34
11	unidentified	5.29			0.08	93
12	camphore	5.96	C <sub>10</sub> H <sub>16</sub> O	(152)	0.07	95
13	bicyclo[3.1.1]hept-2-en-6-ol.,2,7,7-trimethy, acetate	7.57	C <sub>12</sub> H <sub>18</sub> O <sub>2</sub>	(192)	0.94	119
14	bornyl acetate	8.98	C <sub>12</sub> H <sub>20</sub> O <sub>2</sub>	(194)	0.41	95
15	$\beta$ -cubebene	10.96	C <sub>15</sub> H <sub>24</sub>	(204)	0.07	105
16	unidentified	11.70			0.32	41
17	unidentified	11.79			0.03	81
18	$\alpha$ -cubebene	11.88	C <sub>15</sub> H <sub>24</sub>	(204)	0.98	161



**Fig 1 Gas chromatogram of the essential oil of *Asternovi-belgii***

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